



ON THE AIR!

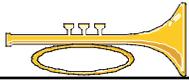


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NOAA Aeronomy Laboratory



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ANNOUNCEMENTS

AL Scientist to Co-Chair IPCC Working Group: Susan Solomon was named new Co-Chair of Working Group I (Science) of the Intergovernmental Panel on Climate Change (IPCC). The election occurred April 20 at the Nineteenth Session of the IPCC plenary in Geneva, Switzerland. Susan will Co-Chair Working Group I with Dahe Qin, Administrator of the Chinese Meteorological Administration. The appointment carries a 6-year term. It will therefore span the period of time under which the next IPCC assessment of climate change is prepared. Scheduled to be completed in 2007, the IPCC Fourth Assessment Report will include state-of-understanding reports from each of the three IPCC Working Groups (WG I, Science; WG II, Impacts, Adaptation, and Vulnerability; WG III, Mitigation). IPCC will also conduct workshops and will likely prepare technical and special reports during the period leading up to this major assessment. Susan is

the only U.S. member in the slate of new appointments. Sir John Houghton of the U.K. held the position in the previous term. Rajendra K. Pachauri of India was elected as overall chair of the IPCC, replacing Robert T. Watson of the U.S.

AMS Special Session on the 2000 Texas Air Quality Study: The 82nd AMS Annual Meeting, held on January 13-17 in Orlando, was the venue for a special session on the results of the 2000 Texas Air Quality Study. AL and ETL scientists participated in the poster and oral presentations. From AL, presenters were Wayne Angevine, Chuck Brock, Fred Fehsenfeld, Paul Goldan, Bill Kuster, Stu McKeen, Andy Neuman, Dennis Nicks, David Parrish, Jim Roberts, Tom Ryerson, Susan Solomon, and Eric Williams. TexAQS-2000 was the largest air quality study ever done in Texas. Up to 250 researchers studied air quality in a broad region of eastern Texas. Six different research aircraft and over 20 ground stations were used in the multi-agency and multi-organization effort.



AWARDS AND RECOGNITION



David Fahey was elected as a Fellow of the American Geophysical Union. Fellowship in the AGU is awarded to scientists who have attained acknowledged eminence in one or more branches of geophysics. The number of Fellows elected each year is limited to no more than 0.1% of the total membership of AGU. Dave's election as AGU Fellow recognizes his many contributions to advancing the current understanding of stratospheric chemistry related to ozone-layer depletion, especially through elucidating the role of nitrogen oxides and particles in the stratosphere.

Fred Fehsenfeld received the NOAA Administrator's Award in recognition of his scientific contributions in developing and leading innovative NOAA research programs in climate and air quality. The award specifically focuses on Fred's recent efforts in spearheading the New England Air Quality Study and the Intercontinental Transport and Chemical Transformation (ITCT) research activity. (See pp. 2-3 of this newsletter for more information about the research.)

Ravi was named the "Centenary Lecturer" for the Royal Society of Great Britain for 2003. He will be giving a 2-week lecture tour sometime in 2003. Ravi is the first scientist in atmospheric chemistry named to this position.

Susan Solomon won the 2002 Weizmann Women Science Award. The Award recognizes Susan's advances to the understanding of the Antarctic ozone hole, her role in providing scientific information to decisionmakers, and her enthusiastic work in fostering the participation of women and girls in science. This award is given every 2 years and carries a research stipend.

Megan Northway received an "Outstanding Student Paper Award" for the 2001 AGU Fall Meeting. Megan's talk was entitled "Constraining Polar Stratospheric Cloud Particle Sizes and Number Concentrations Required to Denitrify the 1999-2000 Arctic Vortex."

News on Stratospheric Particles: Yes, They Do Come in “Extra Large”

The discovery of an “extra-large” category of particles in the Arctic stratosphere has shed new light on the chlorine-chemistry that causes ozone depletion in that region of the Earth.

Scientists in the Aeronomy Lab’s Meteorological Chemistry group made the discovery as they analyzed high-altitude aircraft measurements (NASA ER-2) of reactive nitrogen species from the winter-2000 mission known as SOLVE (SAGE III Ozone Loss and Validation Experiment). Together with international colleagues, they published the findings in the February 2001 issue of *Science*.

Icy, nitric acid-containing “polar stratospheric cloud” (PSC) particles are formed in the polar regions during winter, where they enhance the destruction of ozone by human emissions of chlorine and bromine. The newly discovered population of PSCs has diameters of 10 to 20 micrometers ($10\text{-}20 \times 10^{-6}$ meters), which is about 10 to 20 times larger in diameter than typically observed in PSCs. These particles have eluded detection to date because of their large size and very small abundance in the atmosphere.

The particles have an indirect influence on the ozone layer because they act somewhat like “sponges” for atmospheric nitrogen, in that they are laden with nitric acid. As the particles sediment, or fall out of the atmosphere, they take the

nitric acid with them and the stratosphere becomes “denitrified.” Ozone-destroying forms of chlorine and bromine are longer-lived in a denitrified stratosphere and, as a consequence, ozone destruction increases.

The discovery of this new class of large PSC particles helps to explain a longstanding mystery, namely, that the extent of denitrification observed in the polar stratosphere could not be accounted for by the smaller (and slower-to-sediment) PSCs that had been previously observed. The large-sized PSCs observed in some of the air samples contained 15-20% of the available reactive nitrogen in the Arctic stratosphere and were falling at a rate of 1-2 kilometers per day, demonstrating a huge potential for denitrification by these large particle populations.

Cold temperatures promote the growth of large PSCs and thus enhance the loss of ozone by chlorine and bromine. Unusually cold winters, or climate shifts that reduce stratospheric temperatures or alter the amount of water vapor in the stratosphere, could prolong chemical ozone loss in the Arctic, even as atmospheric chlorine levels fall in response to international curtailments of the use of ozone-depleting chemicals. So, the newly discovered “extra large” particles are a now-recognized factor in predicting the future recovery of the Arctic’s ozone layer.



HOME and AWAY

ITCT 2K2 Campaign: The Intercontinental Transport and Chemical Transformation (ITCT) project is a major new research activity of the International Global Atmospheric Chemistry (IGAC) Program that directly addresses the tropospheric chemistry and transport of ozone, fine particles and other chemically active greenhouse-compounds. This research is aimed at understanding the long-range (intercontinental) transport of ozone and aerosols and the impact that this intercontinental transport has on regional climate and air quality. The inaugural ITCT field campaign (dubbed “ITCT 2K2”) started April 21 in Monterey, CA, and involves several NOAA Research labs, as well as partners in other agencies and academia. The Aeronomy Lab deployed instruments on the NOAA WP-3D research aircraft to measure the amount of the pollutants and to determine the chemical transformation that occurs as they move from one continent to another. ETL deployed wind-profiling radars along the coast from San Francisco to northern Washington to diagnose whether the wind measured is local air or has been transported from across the Pacific. CMDL established a monitoring site at Trinidad Head, CA, where ITCT scientists (including NOAA researchers from AL, CMDL, & PMEL) made ground measurements of surface ozone and other gases, aerosol particles, and solar radiation. GFDL ran chemical transport models during the month-long campaign to produce chemical forecasts to aid in flight planning.

CRYSTAL-FACE Mission: The Cirrus Regional Study of Tropical Anvils and Cirrus Layers - Florida Area Cirrus Experiment mission is an interagency mission designed to investigate the physical properties and formation processes of tropical cirrus clouds. Understanding the production of upper tropospheric cirrus clouds is essential for the successful modeling of Earth’s climate. Six aircraft will sample subtropical convection and cloud systems over southern Florida during July 2002 from a base in Key West, FL. The NASA WB-57 aircraft will carry a comprehensive in situ instrument payload to sample gases and particles in and near convective systems. Onboard the WB-57, the Aeronomy Lab will measure nitric acid, ozone, methane, aerosol composition, water vapor, air pressure, temperature, and winds. CMDL will be measuring long-lived gases.

The New England Air Quality Study: In July and August, NOAA and one of its cooperative institutes, Atmospheric Investigation, Regional Modeling, Analysis, and Prediction (AIRMAP), will conduct the 2002 New England Air Quality Study. AIRMAP is a collaborative effort that involves researchers from the University of New Hampshire, AL, and FSL. It is focused on atmospheric chemical and physical observations in rural and semi-remote areas of New Hampshire, with the goal of understanding the interrelationships in regional air quality, meteorology, and climate phenomena. This summer’s intensive research study is designed to provide scientific information for environmental decision-makers in the region to aid in the development of effective

strategies for air quality management. The mission is using the NOAA Research Vessel Ronald H. Brown deployed in the Gulf of Maine with a complete complement of sensors and instruments. The use of the ship will afford scientists a powerful vantage point to study the role of coastal meteorology in transporting polluted air from the Gulf of Maine to the populated areas in the region. The Aeronomy Lab will install a full suite of gas-phase and aerosol instrumentation. PMEL will measure aerosol composition and characteristics; ETL will have instruments on the ship and will set up Doppler radar at Rye Harbor State Park, New Hampshire; ARL's trajectory model will be used to compute the origin of air masses; and FSL will provide air quality forecasts and help develop the plan for the Ron Brown deployment.



WHAT'S UP WITH PEOPLE

In the Atmospheric Chemical Kinetics group, **Carl Howard** retired in February. He was a research scientist in the Aeronomy Lab for over 30 years. **Matthias Aldener**, a graduate of the University of Stockholm, joined the group in March as a research postdoc. **Elena Jimenez**, from the Universidad de Castilla la Mancha in Spain, began a 1-year visit with the group in February. She is working on the atmospheric degradation of various oxygenated hydrocarbons using a pulsed laser photolysis system.

In March, **Craig Simons** joined the Tropospheric Chemistry group. Craig received a B.S. in Engineering Physics and is working on designs and construction of instruments.

Jochen Schreiner is visiting the Meteorological Chemistry group from Max-Planck Institut für Kernphysik in Heidelberg, Germany. Jochen will be working for several months with Dan Murphy on the single-particle detection instrument.

Hung Nguyen left the Tropical Dynamics & Climate group after completing his assignments on transferring programs from the SUN UNIX system to PC's.

Three students will work at the Aeronomy Lab this summer through the NOAA/CU summer program called PHASE (Practical Hands-on Application to Science Education). They are **Gloria Eshelbrenner** (Sam Houston State University, undergraduate), **Brian Lerner** (University of Colorado, graduate program), and **Matthew Phillips** (University of Colorado, undergraduate).

COMMUNICATING OUR SCIENCE



• **To Decisionmakers:** Dan Albritton and Jim Meagher gave a briefing to Nancy Ragland Perkins, staffer for Sen. Judd Gregg

of New Hampshire, on January 18. The topic was the 2002 activities of the NOAA Research air quality initiatives in New England/New Hampshire... On March 8, Dan Albritton presented a briefing on climate change science to Mary Beth Nethercutt and other staff of NOAA's Legislative Affairs department... Jim Meagher and Susan Solomon gave presentations on air quality and climate change research for Christine Ryan Kojac, Majority Clerk, House Appropriations Subcommittee; Barbara Retzlaff, Director, DOC Budget Office; and members of OAR-Silver Spring in Boulder on April 3-4... Fred Fehsenfeld and Susan Solomon described air quality and climate change research for U.S. Reps. Vern Ehlers, Gil Gutknecht, and Mark Udall on April 5 at DSRC... Jim Meagher attended the NARSTO Executive Assembly annual meeting in Washington, DC, on April 29-30.

To the Scientific Community: Venues included:

- **Scientific Conferences and Symposia:** Ravi gave two invited talks at the annual American Chemical Society meeting in Orlando on April 9-11... At the European Geophysical Society XXVII General Assembly meeting in Nice, France on April 23, Ravi gave an invited talk on the chemistry of the upper troposphere and its impact on ozone... Ken Gage presented an invited

survey of recent developments in turbulence and waves at a Symposium honoring David Atlas at the AMS annual meeting in Orlando, FL, on January 13-16... Chuck Brock participated in the PM2.5 and Electric Power Generation Seminar hosted by DOE's National Energy Technology Lab on April 9-10 in Pittsburgh.

- **Research/Planning Workshops:** Dan Albritton and Ravi participated in the NOAA Climate Services Workshop held January 23-24 in Silver Spring, MD... David Parrish attended an International Global Atmospheric Chemistry (IGAC) Workshop in

Stockholm held in January... Also in January, several scientists in the Meteorological Chemistry group attended the NASA CRYSTAL-FACE Science Team meeting in Baltimore, MD... Ken Gage was invited to participate in the NASA Global Precipitation Mission Ground Validation meeting held in Seattle on February 5-9... David Fahey gave a talk and both David and Ru-Shan Gao presented posters at the NASA Arctic Ozone Loss Workshop held in Potsdam, Germany, on March 4-6... Erik Richard and Karen Rosenlof participated in the Convection and Moisture Experiment (CAMEX-4) Workgroup meeting in New Orleans, LA, in March... David Fahey participated in the Aura Validation Working Group Meeting sponsored by NASA in Pasadena in March... Dan Albritton is participating in teaching at a series of Climate Variability Workshops being organized by the National Weather Service and attended by personnel from the NWS field offices. He spoke on March 27 on climate change knowns and unknowns at the first of the workshops, which are being held at UCAR in Boulder... On March 27, Fred

Fehsenfeld, Jim Meagher, and Eric Williams attended an Atmospheric Investigation, Regional Modeling, Analysis & Prediction (AIRMAP) meeting in Durham, NH.

- **Invited Lectures and Seminars:** Adrian Tuck gave a seminar on "Organic aerosols and the origin of life" to NCAR on January 7 in Boulder, MIT in February, and Birmingham University, England, also in February... On January 28, Michael Trainer presented a seminar on "Ozone Photochemistry during the TEXAQS-2000" for NCAR in Boulder... George Kiladis gave an invited talk at the University of Hawaii on "Observed structure of equatorial waves coupled to convection" in January... In February, David Fahey presented an invited talk on ozone depletion and climate change at the University of Wisconsin in Madison... Susan Solomon gave an invited talk at Trinity University in San Antonio, TX, on April 8.

- **To Media:** On March 18, David Parrish met in Boulder with Rex Dalton, reporter for *Nature*, to discuss the upcoming ITCT mission... Several Aeronomy Lab scientists were involved in filming for the Weather Channel's series on Air Quality Forecasting during a site visit in January. Fred Fehsenfeld, Jim Meagher, Dan Albritton, Tom Ryerson, Stu McKeen, Harald Stark, Linda Koch, Dan Murphy, Mike Schein, and Paula Hudson were interviewed and/or filmed, with Chris Ennis coordinating the visit of producer Randy Flinders of the Weather Channel.

- **To Industry:** Dan Albritton and Jim Meagher met with members of the U.S. Energy Association to discuss NOAA's plans for air quality forecasting on February 8 in Washington, DC.

- **To the Public:** In April, Christopher Williams presented a poster discussing observations from the Aeronomy Lab wind profilers to the DOE Atmospheric Radiation Measurement (ARM) program's Southern Great Plains field site in Oklahoma... Ken Gage led a discussion on "Energy and the Environment" on March 1 as part of a series of nationwide small discussion groups sponsored by the Foreign Policy Association.

- **To Students and Teachers:** During January, Carl Howard conducted chemistry classes at Fairview High School to prepare students for a high-level chemistry exam in the Interantional Baccalaureate Program... In February, David Fahey presented an invited talk on ozone depletion and climate change at Edgewood High School in Madison, WI... Erik Richard hosted a group of undergraduate physics students from Colorado College on March 8, focusing on instrumentation flown on research aircraft... In April, Owen Cooper gave a talk on the

structure of the atmosphere and air pollution transport at Rocky Mountain School for the Gifted and Creative, and later in the month he was joined by CMDL scientists to launch an ozonesonde for the students.... In February, Owen served as a science fair judge at the school. Also serving as science fair judges were: Wally Clark (Boulder Valley School District Science Fair on February 28 and the Montessori Science Fair on March 2); John Daniel (Ryan Elementary, January 24); Ru-Shan Gao (Boulder School District, February); Ned Lovejoy (Boulder Valley Regional Science Fair, February 2); and Karen Rosenlof (Bear Creek Elementary School, February)... David Thomson

volunteered at the Rocky Mountain School for the Gifted and Creative as a mentor for science fair projects in January/February... Gerd Hübler talked about maps to second graders at Eisenhower Elementary School in Boulder... On April 18th, Andy Langford and Chris Ennis hosted an 8th grade student group from Shining Mountain Waldorf School. They visited several DSRC labs, including the Aeronomy Lab.

- **To Our Visitors:** Chris Ennis gave a presentation about the Aeronomy Lab to visiting scientists from the Meteorological Service of Singapore on April 18... Several Aeronomy Lab scientists attended an informal lunch with Dave Evans and Lucia Tsaoussi of OAR Headquarters on April 4 at the Aeronomy Lab. A brief tour of the Aeronomy Lab followed... Dan Albritton, Gerd Hübler, and Paul Goldan hosted a visit of several Chinese

scientists on March 28.

- **Through Service on Scientific Panels and Boards:** In February Adrian Tuck attended the Core Strategic Measurements for Atmospheric Science (COSMAS) meeting, which is a UK National Environmental Research Committee that Adrian chairs... Susan Solomon was a participant on the Advisory Board to the Community Climate System Model Group held in Washington, DC, on January 7-9... In Houston, Jim Meagher participated in the Interim Science Coordinating Committee review of the Texas Air Quality proposals on April 4-5... During the first quarter, Ken Gage assisted with editorial coordination of a Special Issue of the *Journal of Atmospheric and Oceanic Technology* devoted to tropospheric profiling... Susan Solomon was a participant at the National Academy of Sciences meeting held in Washington, DC, on April 22-30.

Temperature and Air Quality Forecasting: The Path to Operations

Efforts are underway in planning a new NOAA endeavor to develop the first-of-a-kind forecasts of both high-resolution temperature and air quality. From the Aeronomy Lab, Dan Albritton and Jim Meagher have been very involved in associated planning meetings this winter/spring (in Boulder, Silver Spring, and Norman, Oklahoma). The research involves several OAR laboratories as well as another of NOAA's Line Offices, the National Weather Service. The overall aims are to build the needed scientific understanding and to craft a "research-to-operations" path leading to new NOAA forecasting products provided by NWS in the future.

 *On the Air!* is a quarterly publication of the NOAA Aeronomy Laboratory. It is posted on the World Wide Web at www.al.noaa.gov. Please send comments, suggestions, or questions to: Chris Ennis (phone 303-497-7538; email: Christine.A.Ennis@noaa.gov).